**Aquatic feed and Feeding/practical**

Lecture: Five

Date: Nov. 15th 2020

**Copepods**

The Copepoda are the largest class of crustaceans forming an important link between phytoplankton and higher trophic levels in most aquatic ecosystems.

* Copepods found in the sea and nearly every [freshwater](https://en.wikipedia.org/wiki/Freshwater) [habitat](https://en.wikipedia.org/wiki/Habitat_(ecology)).
* Some species are [planktonic](https://en.wikipedia.org/wiki/Plankton) (drifting in sea waters), some are [benthic](https://en.wikipedia.org/wiki/Benthos) (living on the ocean floor). Copepods feed directly on [phytoplankton](https://en.wikipedia.org/wiki/Phytoplankton), catching cells singly. Some of the larger species are predators of their smaller relatives. Many benthic copepods eat organic matters or the bacteria that grow in it, and their mouth parts are adapted for scraping and biting.
* They are a group of small [crustaceans](https://en.wikipedia.org/wiki/Crustacean) their size vary considerably, but can typically be 1 to 2 mm.
* They are differ from Artemia and rotifers in that they do not reproduce asexually. Copepods mate after maturing and the female produces 250 to 750 fertilized eggs.
* The copepod lifespan can take a week to a year depending on the species and environmental conditions such as temperature and nutrition (e.g., egg to adult time in the calanoid is 7 days at 25 C but 19 days at 15 C). Generally the average of their life span is 40 to 50 days. Unlike the rotifer, copepods are more difficult to culture on a commercial basis.

Most known copepods species use in fish feed are belong to the group of:

1. *Calanoida*
2. *Harpacticoida*
3. *Cyclopoid*

**Use of Copepods**

Planktonic animals, especially rotifers, cladocerans, and copepods of the order Cyclopoida are the most important food items in freshwater larviculture, and copepod nauplii are especially valuable for feeding fry. Copepods used as natural food are either cultured or collected from natural water bodies.

* Adult and advanced copepods stages of cyclopoids are micropredators that target early life stages of cyprinids (Cyprinidae). Other copepods in aquaculture are fish parasites.
* Copepods are also intermediate hosts for important fish parasites, including tapeworms and nematodes. Damage from these parasites may lead to fish mortalities or reduce the market value of the fish products when parasites are present in fish muscle. Finally, copepods serve as intermediate hosts for parasites that infect humans and can serve as vectors of serious human diseases like cholera.

Nutritional quality of copepods is generally accepted to be very good for marine fish larvae, and believed to be of a high quality. In general copepods have a high protein content (44-52%) and a good amino acid profile.

**Culture procedures**

|  |  |  |
| --- | --- | --- |
| Culture techniques | Culture volume | Productivity (eggs/ day) (l) |
| Semi-extensive | Large ponds 200-10000m3 | 50 |
| Semi-intensive | Tanks 200-300m3 | 100 |
| Intensive | Flasks or tanks 5-110 L | 500-6000 |

**Production of copepods procedure:**

Production of copepods Batch culture of copepods is relatively straight forward once proper environmental and nutritional conditions are met.

1. The culture flasks are stocked with adult copepods (10-25 individuals/ml).
2. The stock cultures maintained in 1L conical flasks containing filtered sea water (20-35 ppt).
3. Fed with microalgae in the ratio 1:25. The copepods are fed with algae on alternate days.
4. The stock culture is maintained by rinsing with filtered sea water.
5. Separate the eggs, nauplii, and adults and put into fresh culture flasks every week.
6. The adult would begin producing eggs/ sperms in 9-12 days; thereafter egg production would initially rise, then reaches the peak and finally falls.

Mass culture for mass culture chlorinated and dechlorinated (using sodium hypochlorite and sodium thiosulphate) sea water is used. The cultures can be maintained in 50L-3000L out–door culture tanks with continuous aeration. Copepods are daily fed with a mixture of micro algal diet.